
Appendix O

Rare Vascular Plants of the Wolf River Basin

The Wisconsin Natural Heritage Inventory lists 68 rare plant species in the Wolf River Basin. Listed below, these include 8 WI Endangered species, 12 WI Threatened species, and 48 Special Concern species. There are two federally listed plants, prairie white-fringed orchid and Fassett's locoweed. Prairie white-fringed orchid is a globally imperiled (G2) species whereas Fassett's locoweed is a critically imperiled variety of a globally secure species (G5T1). Three other Wolf River plant species are considered rare or local across their range (G3, G3G4), and the remaining 61 tracked plant species are considered globally secure (G4, G5).

Many of the plants on this list are associated with wetlands and lake margins. Others grow in upland forests, and several species grow in prairies and savannas.

The vicinity of the proposed Crandon Mine holds a large proportion of the documented rare plant occurrences in the Wolf River Basin. At least 19 of the 68 rare plant *species* in the Wolf River Basin are found around Crandon. An even larger proportion of rare plant *sites* is concentrated there. This reflects the intensive botanical efforts made in that area over the last 40 years and especially in the last 8 years. Some of the rare plant sites around Crandon are on property owned by the mining company, but a great number more are on adjacent County and National forest lands.

Botanists have also paid special attention to land within the Chequamegon-Nicolet National Forest in the last 20 years. Our database shows 9 rare species in the Wolf River Basin portion of the forest. In particular, the wetlands surrounding Kohlhoff Lakes boast 5 rare species. These wetlands are partly owned by private individuals.

The Wolf River Basin portion of Menominee County has supported populations of at least 11 rare species in a wide variety of vegetative communities. Unfortunately, many of those plants grew in the vicinity of Legend Lake, which is now owned by a large number of individuals and has been developed for lake front recreation. Menominee County seems to be especially important for *Medeola virginiana*, which suffers intensive deer herbivory in most other parts of its Wisconsin range.

Plant Summaries

Each of the 68 rare plant species documented in the Wolf River Basin are listed and described below. The descriptions are listed in alphabetic order according to scientific name (written in *italics*) and include each species' geographic distribution, legal status in Wisconsin, and management considerations. The state and federal protection status listed in the table below and the element ranks listed with each species paragraph are defined on the first pages of the Wisconsin Natural Heritage Working List (see Appendix Q).

The dates when the species were last observed vary greatly across the list. Recently observed plant populations are more likely to be extant than those that were reported many decades ago. Nonetheless, old records often represent persisting populations that simply haven't received recent botanical attention. Recent inventory efforts have been concentrated in limited areas of the Wolf River Basin, with a focus on public lands in the southeastern portion of the basin.

Table O-1: Rare Plant Species of the Wolf River Basin

Scientific Name	Common Name	Lastobs Year	State Status	Federal Status
<i>Adlumia fungosa</i>	climbing fumitory	1963	SC	
<i>Amerorchis rotundifolia</i>	round-leaved orchis	1998	THR	
<i>Arabis missouriensis</i> var <i>deamii</i>	Deam's rockcress	1965	SC	
<i>Arethusa bulbosa</i>	swamp-pink	1995	SC	
<i>Asclepias ovalifolia</i>	dwarf milkweed	2000	THR	
<i>Asclepias purpurascens</i>	purple milkweed	1984	END	
<i>Bartonia virginica</i>	yellow screwstem	1916	SC	
<i>Botrychium mormo</i>	little goblin moonwort	2001	END	
<i>Botrychium oneidense</i>	blunt-lobe grape-fern	1994	SC	
<i>Calylophus serrulatus</i>	Yellow evening primrose	1915	SC	
<i>Calypso bulbosa</i>	fairy slipper	1994	THR	
<i>Cardamine pratensis</i> *	cuckooflower	2001	SC	
<i>Carex assiniboinensis</i>	Assiniboine sedge	2001	SC	
<i>Carex formosa</i> *	handsome sedge	2001	THR	
<i>Carex gynocrates</i> *	northern bog sedge	2000	SC	
<i>Carex sychnocephala</i>	many-headed sedge	2000	SC	
<i>Carex tenuiflora</i>	sparse-flowered sedge	2000	SC	
<i>Carex vaginata</i>	sheathed sedge	1994	SC	
<i>Ceratophyllum echinatum</i>	prickly hornwort	1982	SC	
<i>Corallorhiza odontorhiza</i>	autumn coral-root	2000	SC	
<i>Cypripedium arietinum</i>	ram's-head lady's-slipper	2001	THR	
<i>Cypripedium candidum</i>	small white lady's-slipper	1992	THR	
<i>Cypripedium parviflorum</i>	small yellow lady's-slipper	2001	SC	
<i>Cypripedium reginae</i> *	showy lady's-slipper	2000	SC	
<i>Deschampsia cespitosa</i>	Tufted hairgrass	1940	SC	
<i>Diplazium pycnocarpon</i>	glade fern	2001	SC	
<i>Elatine triandra</i>	longstem water-wort	1994	SC	
<i>Eleocharis olivacea</i>	capitate spikerush	1977	SC	
<i>Eleocharis quadrangulata</i>	squarestem spikerush	Unknown	END	
<i>Eleocharis quinqueflora</i>	few-flower spikerush	1977	SC	
<i>Eleocharis robbinsii</i>	Robbins spikerush	1982	SC	
<i>Epilobium palustre</i>	marsh willow-herb	1994	SC	
<i>Equisetum palustre</i>	marsh horsetail	1994	SC	
<i>Equisetum variegatum</i>	variegated horsetail	1994	SC	
<i>Glycyrrhiza lepidota</i>	wild licorice	1915	SC	
<i>Juncus vaseyi</i>	Vasey's rush	1916	SC	
<i>Liatris spicata</i>	marsh blazing star	2000	SC	
<i>Lithospermum latifolium</i>	American gromwell	2000	SC	
<i>Littorella americana</i>	American shore-grass	1931	SC	

Scientific Name	Common Name	Lastobs Year	State Status	Federal Status
<i>Malaxis brachypoda</i>	white adder's-mouth	2000	SC	
<i>Medeola virginiana</i> *	Indian cucumber-root	2001	SC	
<i>Minuartia dawsonensis</i>	rock stitchwort	1965	SC	
<i>Opuntia fragilis</i>	brittle prickly-pear	2000	THR	
<i>Oxytropis campestris</i> var <i>chartacea</i>	Fassett's locoweed	2000	END	LT
<i>Penstemon pallidus</i>	pale beardtongue	1965	SC	
<i>Phegopteris hexagonoptera</i> *	broad beech fern	2001	SC	
<i>Platanthera dilatata</i>	leafy white orchis	1995	SC	
<i>Platanthera flava</i> var <i>herbiola</i>	pale green orchid	1970	THR	
<i>Platanthera hookeri</i>	Hooker's orchis	1916	SC	
<i>Platanthera leucophaea</i>	prairie white-fringed orchid	2000	END	LT
<i>Platanthera orbiculata</i> *	large roundleaf orchid	1931	SC	
<i>Potamogeton confervoides</i>	algae-like pondweed	1994	THR	
<i>Psilocarya scirpoides</i>	long-beaked baldrush	2000	THR	
<i>Ranunculus gmelinii</i>	small yellow water crowfoot	1994	END	
<i>Ribes hudsonianum</i>	northern black currant	2001	SC	
<i>Scirpus torreyi</i>	Torrey's bulrush	1994	SC	
<i>Talinum rugospermum</i>	prairie fame-flower	2000	SC	
<i>Thalictrum revolutum</i>	waxleaf meadowrue	2000	SC	
<i>Trillium nivale</i>	snow trillium	2000	THR	
<i>Triglochin maritima</i> *	common bog arrow-grass	2001	SC	
<i>Utricularia purpurea</i>	purple bladderwort	1982	SC	
<i>Utricularia resupinata</i>	northeastern bladderwort	1994	SC	
<i>Vaccinium cespitosum</i>	dwarf huckleberry	1994	END	
<i>Vaccinium vitis-idaea</i> ssp <i>minus</i>	mountain cranberry	1994	END	
<i>Valeriana sitchensis</i> ssp <i>uliginosa</i>	marsh valerian	2000	THR	
<i>Verbena simplex</i>	narrow-leaved vervain	1979	SC	
<i>Viburnum cassinoides</i>	northern wild-raisin	1973	SC	
<i>Viola rostrata</i>	long-spur violet	1979	SC	

Protection Categories: **State Status:** END=endangered; THR=threatened; SC=special concern. **Federal Status:** Federal protection status designated by the Office of Endangered Species, U.S. Fish and Wildlife Service indicating the biological status of a species in the United States. LE = listed endangered; LT = listed threatened.

* there are also occurrences located within the Lower Wolf River Bottomlands Natural Resources Area inventory area

Climbing Fumitory (*Adlumia fungosa*) – Special Concern S3 G4

This delicate, sprawling vine grows from rocky substrates in forest gaps, often those left by disturbance such as fire or wind-throw. It grows in the northeastern quarter of the United States, ranging from Maine to Minnesota, and south to Tennessee and North Carolina. Of the 40 populations documented in Wisconsin, one falls within the Wolf Basin and that is a site in Menominee County that was last observed in 1963.

Conservation Concerns: Dispersal between ephemeral habitat patches.

Round-leaf Orchis (*Amerorchis rotundifolia*) – WI Threatened S1 G5

This plant ranges from Alaska to Greenland and as far south as Washington County, Wisconsin. The 14 Wisconsin populations have been found in cold, neutral bogs and coniferous forests north of the Tension Zone. One population is known to have died off,

and 4 haven't been verified in the last 20 years. In 1998, a botanist photographed round-leaf orchis on private property in Marathon County within the Wolf River Basin.

Conservation Concerns: Wetland drainage or flooding; loss of habitat due to logging and attendant loss of canopy cover and soil disturbance. Poaching by orchid fanciers.

Deam's Rockcress (*Arabis missouriensis* var. *deamii*) – Special Concern S3 G4G5QT3?Q

Across its range in Vermont, New York, Michigan, Indiana, Missouri, and Wisconsin, this herb is known from a wide range of open, well-drained habitats. In Wisconsin, Deam's rockcress typically grows in dry, sunny borders of open woods over gravel, rocks, or sand. The six sites within the Wolf River Basin are scattered through 4 counties and have not been verified for more than 20 years.

Conservation Concerns: Succession in barren habitat; trampling in the course of recreation; mining.

Swamp Pink (*Arethusa bulbosa*) – Special Concern S3 G4

This orchid has a single brilliant rose-purple flower, and is endemic to the boreal and north-temperate parts of eastern North America. It grows in deep sphagnum moss substrates in open bogs and floating mats (often around lakes), peaty acidic sedge meadows, and partial canopy gaps in coniferous swamps. Wisconsin's largest populations are along the shore of Lake Superior in areas of extensive bogs in Bayfield and Ashland counties, both along mainland and in the Apostle Islands National Lakeshore. Botanists have documented four sites, most recently in 1995, within the Wolf River Basin, including 2 in the vicinity of the proposed Crandon Mine (Hemlock Creek and Rolling Stone Wetlands) and 2 sites on the Nicolet National Forest (Windfall Lake and Kohlhoff Lakes).

Conservation Concerns: Wetland draining or flooding; poaching by orchid fanciers.

Dwarf Milkweed (*Asclepias ovalifolia*) – WI Threatened S3 G5?

This perennial flower grows in prairies and oak-pine barrens. It is endemic to the central U.S. and adjacent Canada. Dwarf milkweed is known in Wisconsin from over 50 sites in sand and oak barrens areas, mostly in the central and northwestern parts of the state. In the early 20th Century, several populations were scattered throughout the southern part of Wisconsin, but all of the southern populations appear to have died off. In the Wolf River Basin, there are two documented populations, including one near Warington Lake, in southeastern Oconto County.

Conservation Concerns: Succession and weed invasion in unmanaged barren habitats.

Purple Milkweed (*Asclepias purpurascens*) – WI Endangered S2 G4G5

This perennial flower is known from dry habitats from New Hampshire to Wisconsin and south to Oklahoma and Virginia. In Wisconsin, it almost always grows in canopy gaps in deciduous woodlands, although it is also known from prairie. The 55 known occurrences lie in the southern half of the state, and the majority of recently verified occurrences fall in the southwestern fifth of the state. Our populations tend to be very small (less than 50 plants), isolated, and vulnerable with very few protected sites. In the Wolf River Basin,

purple milkweed is only documented from a roadside prairie remnant near Wild Rose (Waushara County 1984).

Conservation Concerns: Road expansion and maintenance; loss of habitat due to succession.

Yellow Screwstem (*Bartonia virginica*) – Special Concern S3 G5

This herb of the eastern U.S. and Canada grows in seasonally wet, periodically disturbed, sandy-peaty ditches. Less common habitats include acidic sphagnum woods, poor fens, and even moist riverbanks. Botanists have documented yellow screwstem in 14 Wisconsin counties, with a profusion of recent sites in the former bed of Glacial Lake Wisconsin in the central part of the state. Within the Wolf River Basin, botanists collected yellow screwstem in Shawano and Waushara counties in the 1910's.

Conservation Concerns: Succession; conversion of habitat to cranberry bogs; seems to require specific disturbance regime.

Little Goblin Moonwort (*Botrychium mormo*) – WI Endangered S2S3 G3

This inconspicuous fern grows in deciduous forests in northern Minnesota, Wisconsin, and Michigan. With the possible exception of an unverified report in Quebec, it is unknown from anywhere else. It seems to prefer mature maple-basswood forests, although it also grows in younger stands and in stands that include some hemlock or other species. After it was discovered on the proposed Crandon Mine site, botanists devoted extraordinary efforts to finding more of the ferns at other sites. In 1994 and 1995, surveyors more than doubled the number of known *B. mormo* sites in deciduous forests. Now there are 63 documented sites, and almost all of them have been verified in the 1990s. There are 17 documented occurrences, most recently from 2001, in the Wolf River Basin, and they are strongly clustered in the vicinity of the proposed Crandon Mine. It is unclear whether this cluster and the corresponding paucity of records west of there reflect the actual abundance of *B. mormo* or rather the concentration of botanical efforts around Crandon.

Conservation Concerns: Intensive logging and attendant loss of canopy cover and soil disturbance.

Blunt-lobed Grape-fern (*Botrychium oneidense*) – Special Concern S2 G4Q

This fern grows in moist, shady, acidic woods and swamps from New Brunswick to Minnesota and south to the Smoky Mountains. Fifteen documented sites are scattered across northern Wisconsin, with 5 occurring in the Wolf River Basin. Four of those are near the proposed Crandon Mine, and one was reported in 1978 from Waupaca County, near the Trout Nace Creek State Fishery Area.

Conservation Concerns: Uncertain.

Yellow evening primrose (*Calylophus serrulatus*) – Special Concern S3 G5

This small forb grows mostly in dry prairie and plains from western Michigan, Wisconsin, and Minnesota to Alberta and south to Illinois, Arkansas, Texas, Arizona, and Chihuahua. Many of the approximately 20 records in Wisconsin are on steep bluff prairies along the Mississippi and lower St. Croix rivers and on cedar glades. The species has occasionally been found in moister prairies. The only record is from 1915 in

Waushara County, and the location information is imprecise so the occurrence might not be in the Wolf River Basin.

Conservation Concerns: Uncertain. Loss of limited habitat due to land use conversion.

Fairy Slipper (*Calypso bulbosa*) – WI Threatened S3 G5

This circumboreal orchid is common in the Pacific Northwest. In the Great Lakes region, fairy slipper lives in mature cedar and mixed-conifer swamps. Most of the 46 known Wisconsin populations have been very small, and 31 have been verified in the last 20 years. Within the Wolf River Basin, there are two populations on the Nicolet National Forest and 3 more near the proposed Crandon Mine site.

Conservation Concerns: Vulnerable to habitat changes, including water level increase or decrease; loss of habitat due to logging.

Cuckooflower (*Cardamine pratensis*) – Special Concern G5 S3

This circumboreal herb lives in calcareous marshes and swamps as far south as northern Indiana. Botanists report it from the eastern third of Wisconsin. Cuckooflower has been documented from 45 sites in Wisconsin, of which 22 have been verified in the past 20 years. As of 2001, there are 6 documented populations in the Wolf River basin, including 4 in the planning area. In 1999, Andy Clark, BER botanist, documented this flower from Shaky Lake SNA and the Mukwa and Wolf River state wildlife areas. In 1949, it was reported from a bog along what was formerly known as Beasley Lake (now called Chain o' Lakes), which has since been heavily developed.

Conservation Concerns: Wetland draining or flooding; lake shore development.

Assiniboine Sedge (*Carex assiniboinensis*) - Special Concern S3 G4G5

This distinctive stoloniferous sedge grows in rich woods, thickets, and shores from southern Manitoba to Wisconsin, Iowa, and South Dakota. In Wisconsin, it grows predominantly in floodplain forests. We have 25 documented sites, of which 20 have been verified within the last 20 years. Within the Wolf River Basin, it is known from a total of 5 locations including the Menominee Reservation and 3 sites in the vicinity of the proposed Crandon Mine.

Conservation Concerns: Loss of habitat due to intensive logging; disruption of seasonal flooding patterns.

Handsome Sedge (*Carex formosa*) – WI Threatened S2 G4

Botanists know this sedge from scattered deciduous forests of varying composition from northern New England to North Dakota. In Wisconsin, it grows in damp or wet woods and thickets of a few eastern counties, totaling about a dozen sites. There have been four populations documented in the planning area of the Wolf River Basin, with the most recent in 2001, including populations near Mukwa and Wolf River Bottoms-Lasage Unit state wildlife areas. In 1949, it was reported from Appleton, but that is downstream from the focus area of this report.

Conservation Concerns: Uncertain.

Northern Bog Sedge (*Carex gynocrates*) – Special Concern S2 G5

This circumboreal sedge ranges as far south as Pennsylvania, Michigan, Minnesota, and Utah. Northern bog sedge lives in sphagnum bogs and cedar swamps, and has been documented from about 20 sites in northern and eastern Wisconsin. Nine of those sites fall within the Wolf River Basin, including Argonne Swamp and Roberts Lake on the Nicolet National Forest, 3 spots in the vicinity of the proposed Crandon Mine site, and a cedar swamp near New London (1931). Two populations have been verified in the planning area, most recently in 2000.

Conservation Concerns: Wetland drainage or flooding; disruption of groundwater flow.

Many-headed Sedge (*Carex sychnocephala*) – Special Concern S2 G4

Scattered in a range from New York to Saskatchewan and south to Missouri, this peculiar sedge's rarity may be largely due to its ecological restriction to sandy or mucky, drying lake or river shores. In Wisconsin, botanists have reported it growing on sandy and/or marly shores of 13 lakes. Within the Wolf River Basin, there are 4 reported occurrences with the most recent in 2000.

Conservation Concerns: Lake shore development; water level stabilization; eutrophication.

Sparse-flowered Sedge (*Carex tenuiflora*) – Special Concern S3 G5

A circumboreal species that ranges as far south as Maine, New York, Michigan, and Minnesota, *C. tenuiflora* has been found at over forty Wisconsin sites, primarily in northeastern part of the state. It grows in sphagnum bogs, conifer swamps, and on peaty shores. Within the Wolf River Basin, it has been documented from 7 sites including Kohlhoff Lakes and Argonne Swamp on the Nicolet National Forest and 4 spots in the vicinity of the proposed Crandon Mine site.

Conservation Concerns: Wetland drainage or flooding.

Sheathed Sedge (*Carex vaginata*) – Special Concern S1 G5

This wide-ranging polar sedge reaches the southern extent of its range in Maine and northern New York, Michigan, Wisconsin, Minnesota, Saskatchewan, and British Columbia. Our 26 sites are concentrated in the northeastern counties and in Douglas County, and most of them have been recently verified. Its habitat consists of conifer swamps, fenny bogs, and alder thickets. Botanists documented 5 sites in the vicinity of the proposed Crandon Mine in 1994.

Conservation Concerns: Wetland draining or flooding; disruption of groundwater flow.

Prickly Hornwort (*Ceratophyllum echinatum*) – Special Concern S2 G4?

Found in quiet waters throughout much of North America, botanists are uncertain about the status of this plant. It may be truly rare or merely overlooked because of its similarity to the common coontail (*C. demersum*). Botanists have collected prickly hornwort at 21 spots in northern and central Wisconsin, and verified nine of them in the last 20 years. The only documented site within the Wolf River Basin is from 1982 at Pine Lake in Menominee County.

Conservation Concerns: Disruption of habitat as a result of recreational activities; alteration of water quality.

Autumn coral-root (*Corallorhiza odontorhiza*) – Special Concern S3 G5

Autumn coral-root ranges from Maine and Vermont south to Georgia, westward to Mississippi and through Ohio and Michigan to Wisconsin, Iowa, and Missouri. It can be found in rich deciduous woods, mostly beech-sugar maple, or in mixed hardwood forests under oaks. Occasionally, it is found in pine plantations in sandy soils. Of the 42 documented sites in Wisconsin, botanists have verified 30 in the last 20 years. Most of the sites are in southern Wisconsin. In 2000, botanists in the Wolf River Basin located a population.

Conservation Concerns: Loss of habitat due to intensive timber management; orchid poaching.

Ram's-head Lady's-slipper (*Cypripedium arietinum*) – WI Threatened S1 G3

Known from Quebec and Manitoba south to Minnesota and New York, this orchid appears rare everywhere except northern Michigan. It grows in cool places on subacid or neutral soils. Best known from old white cedar swamps, the species also grows in boreal woodlands on red clay and cedar or pine forests on sand. Of the 26 documented Wisconsin sites, botanists have verified 17 in the last 20 years. Only in Door and Vilas counties do some populations appear vigorous. In the Wolf River Basin, botanists documented ram's-head from Center Swamp (Outagamie County, 1928), Lebanon Swamp (Waupaca County, 1931), and an additional site in 2001.

Conservation Concerns: Wetland drainage or flooding; heavy logging resulting in altered or destroyed habitat; poaching by orchid fanciers.

Small White Lady's-slipper (*Cypripedium candidum*) – WI Threatened S3 G4

Rare or threatened through most of its range, this orchid grows from New York and New Jersey southward to Pennsylvania, westward through the Great Lakes states, Missouri, and Nebraska. It grows in marl bogs, fens, lake shores, wet prairies, and sedge meadows, sometimes persists while being shaded out during succession. In Wisconsin, the 77 sites are concentrated in the southeastern quarter; the Wolf River Basin is on the northern edge of the range of *C. candidum* in the state. The two known sites in the Wolf River Basin are in Winnebago County along the Oshkosh-Larsen trail.

Conservation Concerns: Succession; invasive species; wetland draining or flooding; lowered water table; poaching by orchid fanciers.

Small Yellow Lady's-slipper (*Cypripedium parviflorum*) – Special Concern S3 G5

The global distribution of this orchid is unclear due to taxonomic disagreements among the authorities. Some consider this taxon merely a variety of the more common large yellow lady's-slipper, and others elevate it to the full species status. Small yellow lady's-slipper has been reported from northern portion of the eastern U.S. in several habitats, particularly in limy areas, including tamarack swamps and woods in the southern portions of the range and white cedar swamps in the north as well as wet meadows, wet prairies, and fens. In Wisconsin, the small yellow lady's-slipper has been reported from over 70 locations, mostly in the southeast portion of state. However, 40 of these records are

historical, and their current status is unknown. Most recent records have come from cedar swamps and other limy areas in northwest Wisconsin. There are 4 known sites within the Wolf River Basin and the most recent location was documented in 2001.

Conservation Concerns: Deer herbivory; any activities that disrupt canopy or hydrologic regime; poaching by orchid fanciers.

Showy Lady's-slipper (*Cypripedium reginae*) – Special Concern S3 G4

Cypripedium reginae occurs mainly in southeastern Canada and the northeastern U.S. where it grows in semi-open calcareous swamps and fens and occasionally in open wetlands and wet woods. While it has been reported from nearly 100 sites throughout Wisconsin, about one-half of those records are historical. The most recent reports are from the northeastern part of the state. Fifteen occurrences are within the Wolf River Basin, with observation dates ranging from 1916 to 2000. The observations were made in the Nicolet National Forest, the Menominee Reservation, near the proposed Crandon mine site, and other locations. One population was reported in the planning area in 2000.

Conservation Concerns: Deer herbivory; wetland flooding or draining and other hydrologic disruptions; poaching by orchid fanciers.

Tufted hairgrass (*Deschampsia cespitosa*) – Special Concern S3 G5

Tufted hairgrass is a circumboreal species that lives in wet or boggy ground and ranges south to New Jersey, West Virginia, North Carolina, Illinois, Minnesota, and Arizona. The approximately 33 documented occurrences of this species are scattered across Wisconsin in fens, sandstone and dolomite splash pools on the Great Lakes, springs, marly bog pools, and cedar swamps. The only occurrence in the Wolf River Basin was documented in 1940 in Waushara County. The location information was imprecise so the record might not actually be within the Basin.

Conservation Concerns: Wetland flooding or draining; habitat conversion.

Glade fern (*Diplazium pycnocarpon*) – Special Concern S2 G5

This species lives in cool woods and on talus slopes from southern Quebec to Ontario and Minnesota and south to Florida and Louisiana. In Wisconsin, it is most commonly found in rich mesic deciduous forests with dolomite near the surface. Glade fern has been documented at about 18 sites in Wisconsin, and botanists have verified 9 populations in the past 20 years. In 2001, one population was verified in the Wolf River Basin.

Conservation Concerns: Loss of habitat due to land conversion or intensive timber management.

Longstem Water-wort (*Elatine triandra*) – Special Concern S1 G5

This aquatic plant grows in shallow water and shores from Wisconsin west to Alberta and south to northern Mexico. Of the 3 documented Wisconsin populations, only one, at Oak Lake (near the proposed Crandon Mine site), has been verified in the last 20 years.

Conservation Concerns: Siltation, eutrophication, and hydrologic disturbance.

Capitate Spikerush (*Eleocharis olivacea*) – Special Concern S2 G5

Known from the Great Lakes region and the Atlantic coastal plain, this plant grows on floating mats and lake shores on a variety of soil types. Of the 9 documented Wisconsin occurrences, only 1 has been verified in the last 20 years. In the Wolf River Basin, the only occurrence is a collection with an unknown date from Mud Lake Bog in Waupaca County.

Conservation Concerns: Lake shore development.

Squarestem Spikerush (*Eleocharis quadrangulata*) – WI Endangered SH G4

Growing in shallow water from Massachusetts to Florida and west to Texas and Missouri, Wisconsin lies at the northwest corner of the range of this species. No botanists have documented squarestem spikerush in Wisconsin for several decades. An article from 1939 reported it from Shawano Lake. The only two other historic populations in Adams and Walworth counties are presumed extirpated.

Conservation Concerns: Uncertain but probably altered water quality and lake shore development.

Few-flower Spikerush (*Eleocharis quinqueflora*) – Special Concern S2 G5

This plant ranges from Newfoundland, across the Great Lake region to Minnesota, and as far south as Illinois and Indiana. It grows on damp calcareous shores, ledges, and in swamps. It is known from 15 sites in the eastern half of Wisconsin. Botanists have confirmed 3 of them in the last 20 years. Two sites within the Wolf River Basin occur at Mud Lake Bog in Waupaca County (1977) and Kusel Lake in Waushara County (1935).

Conservation Concerns: Lake shore development.

Robbins Spikerush (*Eleocharis robbinsii*) – Special Concern S3 G4G5

This species ranges from along the Atlantic coast inland to the western Great Lakes. Its habitat consists of sandy-mucky shorelines and marshy bogs. It grows as an emergent aquatic plant in lakes and ponds. There are about 18 records of this species in the northwestern and east-central parts of the state. However, most of the occurrences of Robbins spikerush are from Oneida and Vilas counties. In the Wolf River Basin, one population was reported in the Menominee Reservation's Pine Lake, and another lies just east at Warington Lake.

Conservation Concerns: Lake shore development.

Marsh Willow-herb (*Epilobium palustre*) – Special Concern S2 G5

This circumboreal species ranges as far south as Pennsylvania, Wisconsin, Colorado, and Nevada. This species of low, wet ground has been reported from scattered localities throughout the state, with most occurrences in the northwest and northeast. The three known sites within the Wolf River Basin were all confirmed in 1994 near the proposed Crandon Mine site. Of the 33 Wisconsin populations, 26 have been confirmed in the last 20 years.

Conservation Concerns: Wetland drainage or flooding.

Marsh Horsetail (*Equisetum palustre*) - Special Concern S3 G5

Marsh horsetail is a circumboreal species that extends as far south as Pennsylvania, Illinois, North Dakota, and Washington. It grows in river and lake shores as well as sedge meadows and swamps. Sites are scattered around Wisconsin, with a concentration in Bayfield County. Botanists have reported 24 Wisconsin occurrences, including 7 in the last 20 years. In 1994, botanists collected it in Lincoln Cedar Swamp, near the proposed Crandon Mine site.

Conservation Concerns: Wetland flooding or draining.

Variegated Horsetail (*Equisetum variegatum*) – Special Concern S3 G5

This circumboreal species extends as far south as Pennsylvania, Illinois, Minnesota, and Colorado. Variegated horsetail grows on moist or seasonally wet open habitats along Wisconsin's eastern and northern fringe. Botanists have reported 44 Wisconsin occurrences, including 31 in last 20 years. In 1994, botanists collected the species in Hemlock Creek Hardwoods near the proposed Crandon Mine site.

Conservation Concerns: Trampling from recreational activities; lowered water table.

Wild Licorice (*Glycyrrhiza lepidota*) – Special Concern S2 G5

This flower is widespread through the western US and adjacent Canada, reaching its eastern edge in Wisconsin. It grows in moist prairies and on rocky, disturbed ground. It appears that some of Wisconsin's populations are native, and others are the result of human introduction in railroad materials. Botanists consider the one population in the Wolf River Basin from Shawano County (1915) to be introduced, and therefore not warranting protection.

Conservation Concerns: Uncertain.

Vasey's Rush (*Juncus vaseyi*) – Special Concern S3 G5?

This rush grows in wet-mesic prairies, sedge meadows, and other open, moist habitats across Canada and the northern U.S. Botanists have documented 38 occurrences in Wisconsin, of which 33 are in Douglas County. The one known occurrence within the Wolf River Basin was along a railroad between Shawano and Cecil and was last observed in 1916.

Conservation Concerns: Uncertain.

Marsh blazing star (*Liatris spicata*) – Special Concern S2S3 G5

This species occurs in wet meadows and other moist, open habitats from New York to Michigan and southeastern Wisconsin south to Florida and Louisiana. It is found occasionally west to Wyoming and New Mexico. In Wisconsin, the preferred habitat for marsh blazing star is moist, sandy calcareous prairies. Of the 34 documented occurrences in Wisconsin, 22 have been verified in the past 20 years. In Wisconsin, marsh blazing star primarily occurs in the far southeast corner of the state but there is one record along the Oshkosh-Larsen trail in Winnebago County.

Conservation Concerns: Loss of habitat due to land conversion; herbicide drift.

American gromwell (*Lithospermum latifolium*) – Special Concern S3 G4

American gromwell ranges from New York to Minnesota, south to West Virginia, Tennessee, and Missouri. Across its range, the species is generally found in dry wood and thickets. It is most commonly found in southern Wisconsin in upland hardwood forests, often with dolomite near the surface. The species has been documented 72 times, with 48 of those in the past 20 years including one site in the Wolf River Basin.

Conservation Concerns: Loss of habitat due to intensive logging or succession.

American Shore-grass (*Littorella americana*) – Special Concern S2 G5

In North America, this plant is restricted to southeastern Canada to northern New York, Minnesota, and Wisconsin. All of the known extant sites in Wisconsin of this species are in Vilas and adjacent northeast Forest counties. Also a very few other historical, occurrences have been reported from other parts of state. In the Wolf River Basin, a botanist reported *L. americana* from Shawano Lake in 1931.

Conservation Concerns: Probably very sensitive to water chemistry and clarity.

White adder's-mouth (*Malaxis brachypoda*) – Special Concern S3 G4Q

This circumboreal orchid ranges as far south as New Jersey, Pennsylvania, Illinois, Minnesota, Colorado, and California. Across its range, white adder's-mouth grows in damp woods and bogs. In Wisconsin, it has been found in neutral or calcareous conifer or black ash swamps. The species has been documented 49 times in Wisconsin, mostly in the northeast quarter, and 31 of those have been verified in the past 20 years including one in the Wolf River Basin in 2000.

Conservation concerns: Loss of habitat due to intensive timber management.

Indian cucumber-root (*Medeola virginiana*) – Special Concern S3 G5

This forest lily has yellow-green flowers and grows in rich woods from Nova Scotia to Wisconsin, and south to Virginia and northern Missouri. In Wisconsin, its distribution closely matches that of beech (*Fagus grandiflora*), which also reaches the western edge of its range in our eastern counties. In the narrow band where Indian cucumber root grows, its populations are sometimes large (scattered through miles of forest), but intense deer browse may be limiting its reproduction. Botanists have verified 21 of Wisconsin's 57 documented *Medeola* occurrences in the last 20 years. Twenty reports are from scattered points across the Wolf River Basin with 7 populations documented in the planning area boundary, most recently in 2001.

Conservation Concerns: Deer herbivory; intensive forestry management.

Rock Stitchwort (*Minuartia dawsonensis*) – Special Concern S2 G5

This forb ranges from New Foundland to Minnesota, Alaska, and British Columbia. It grows on cliffs and sandy or rocky prairies and woodlands. Historically known from 20

sites in Wisconsin south of the Tension Zone, botanists have verified 12 occurrences in the last 20 years. In 1965, a botanist collected a single specimen a few miles south of Mukwa State Wildlife Area, which is the only known site within the Wolf River Basin.

Conservation Concerns: Loss of habitat due to succession; mining.

Brittle prickly-pear (*Opuntia fragilis*) – WI Threatened S3 G4G5

Wisconsin is at the eastern limit of this range of this species, which is centered on the Great Plains and Rocky Mountains. In Wisconsin, it is found on dry sandy barrens and thin-soiled bluffs in the central sands and west-central counties. Of the 42 documented Wisconsin sites, 24 have been verified in the last 20 years. In the Wolf River Basin, botanists have documented it from 2 sites, most recently in 2000. Poppy's Rock (Waupaca County, 2000) and the Pine River Cemetery (Waushara County, 1972).

Conservation Concerns: Loss of habitat due to succession; mining; trampling associated with recreational activities; invasive species.

Fassett's Locoweed (*Oxytropis campestris* var. *chartacea*) – WI Endangered US Threatened S1 G5T1

This purple-flowered member of the pea family grows in the open sand around a few lakes in Wisconsin and nowhere else in the world. In the last 20 years, botanists have reported it from 6 lakes in central Wisconsin and 2 in Bayfield County. One of the former, Pickerel Lake, is a State Natural Area, and falls within the Wolf River Basin.

Conservation Concerns: Trampling due to recreational activities; invasion species.

Pale Beardtongue (*Penstemon pallidus*) – Special Concern S2 G5

This forb grows in dry to dry-mesic prairies and open woods from Maine to Minnesota and south to Arkansas. Historically, botanists have documented pale beardtongue from 16 spots around Wisconsin, but none of them have been verified since 1971. In 1965, a botanist collected pale beardtongue south of Pine River in Waushara County.

Conservation Concerns: Loss of habitat due to succession or destruction.

Broad beech fern (*Phegopteris hexagonoptera*) – Special Concern S2S3 G5

This fern grows in rich hardwood or mixed conifer-hardwood forests from Quebec and Maine to Ontario and Minnesota, south to northern Florida and Texas. Thirteen of the twenty known occurrences in Wisconsin have been documented since 1985, including one in the planning area in the Wolf River Basin from Outagamie County in 2001.

Conservation Concerns: Uncertain. Avoid activities that might promote erosion.

Leafy White Orchis (*Platanthera dilatata*) – Special Concern S3 G5

This orchid species ranges from Greenland and Iceland to Alaska and northeastern Asia, south to New York, Pennsylvania, Ohio, Iowa, New Mexico, and California. It grows in spring-fed bogs, fens, semi-open conifer swamps, and along shore lines. There are about 35 records of this species in Wisconsin although many of them are historical and haven't

been verified in recent years. Most of the state's occurrences are from northeast Wisconsin, including a recent report from Kohlhoff Lake on the Nicolet National Forest and a 1931 specimen from Lebanon Swamp, located just north of Mukwa State Wildlife Area.

Conservation Concerns: Wetland drainage or flooding; disruption of groundwater flow.

Pale Green Orchid (*Platanthera flava* var. *herbiola*) – WI Threatened S2 G4T4Q

This orchid ranges from Nova Scotia down to North Carolina and out to the western Great Lakes region. It is rare in many states within its range. It grows in wet acidic spots such as sandy ditches, wet prairies, alder thickets, and openings in floodplain forests. Botanists have documented it from 36 spots around Wisconsin, including 15 that have been verified in the last 20 years. In the Wolf River Basin, we have a 1970 report from private property in northeastern Waushara County.

Conservation Concerns: Uncertain.

Hooker's Orchis (*Platanthera hookeri*) – Special Concern S3 G5

This perennial flower grows in woods from Nova Scotia to Minnesota and south to Indiana and Illinois, and is most abundant near the Great Lakes. It grows mainly in coniferous woods on sandy or humus-rich soils. Of the 58 reported sites in Wisconsin, 19 have been confirmed in the last 20 years. In 1916, a botanist collected Hooker's orchis at Briarton, near the present-day Navarino Wildlife Area.

Conservation Concerns: Loss of habitat due to intensive forest management; development; poaching by orchid fanciers.

Prairie White-fringed Orchid (*Platanthera leucophaea*) – WI Endangered US Threatened S1 G2

This orchid's lacy spires of white flowers are found only in wet prairies east of the Mississippi. It has been devastated by habitat destruction, and faces more difficulty due to the sparseness of its pollinators, which are hawk moths. It is not secure anywhere in its range. Although most of its range falls south of the Wolf River Basin, it grows in 4 spots along the Oshkosh-Larsen trail in Winnebago County.

Conservation Concerns: Loss of habitat due to wetland draining and flooding, land use conversion, and succession; herbicide drift from adjacent agriculture production; pollinator loss; invasive species; poaching by orchid fanciers.

Large Roundleaf Orchid (*Platanthera orbiculata*) – Special Concern S3 G5?

This species occurs throughout Canada and much of the northern and mountainous U.S. It inhabits dry to wet conifer forests, conifer-hardwood forests, and hardwood forests and swamps. Most recent reports of the species in Wisconsin are along Lake Superior and along Lake Michigan in Door County. Inland reports are almost entirely historical. In the Wolf River Basin, reports from the early decades of the 20th Century cite two spots in the Menominee Reservation and another from Cedar Creek Bog in Waupaca County. One record from 1931 is in the planning area.

Conservation Concerns: Wetland draining or flooding; conversion from conifer to hardwood forest; intensive logging; poaching by orchid fanciers.

Algae-like Pondweed (*Potamogeton confervoides*) – WI Threatened S2 G4

Occurring in southeastern Canada and northeastern U.S., this is a submerged aquatic species of soft water lakes and ponds. It appears uncommon throughout its range. In Wisconsin, records are mostly from the northeast, although there is a historical record from Juneau County. One population at Duck Lake in Forest County falls within the Wolf River Basin and is near the proposed Crandon Mine.

Conservation Concerns: Changes to water quality or hydrology.

Long-beaked Baldrush (*Psilocarya scirpoides*) – WI Threatened S1 G4

This emergent annual grows on wet sandy soil in marshes, on the borders of sloughs and lakes, and in peaty wetlands. The core of its range is the Atlantic Coastal Plain, but it has disjunct occurrences in Michigan, Indiana and Wisconsin. In Wisconsin, botanists have reported 6 locations in the central sand counties, of which 3 fall within Wolf River Basin: Scout Lake (2000) and Mud Lake in Waushara County (1978) and Long Lake Marsh in Waupaca County (1932).

Conservation Concerns: Changes to water quality or hydrology.

Small Yellow Water Crowfoot (*Ranunculus gmelinii*) – WI Endangered S1 G5

This aquatic buttercup grows in a variety of wet habitats from central Alaska to Newfoundland and south as far as Iowa. It is rare in all of our neighboring states, and only thinly scattered through northern Wisconsin, with a concentration of sites in northern Douglas County. In 1994, botanists reported small yellow water crowfoot growing in a stream near the proposed Crandon mine site.

Conservation Concerns: Hydrologic disturbances; disturbances associated with recreational activities.

Northern Black Currant (*Ribes hudsonianum*) – Special Concern S3 G5

This shrub grows in seepy spots within calcareous swamps. Known throughout Canada, it ranges to the northern parts of the western U.S. and the western Great Lakes region as far south as Iowa. Our records indicate that northern black currant is uncommon but widely distributed in northern Wisconsin. 47 of the 63 documented occurrences have been confirmed in the last 20 years. There are eleven reports from the Wolf River Basin, with clusters in the Nicolet National Forest and the area around the proposed Crandon Mine.

Conservation Concerns: Wetland flooding or drainage; cutting white cedar resulting in loss of habitat.

Torrey's Bulrush (*Scirpus torreyi*) – Special Concern S2S3 G5?

This emergent plant forms colonies in quiet, shallow water from New Brunswick to Manitoba and south as far as Virginia and Missouri, leaving Wisconsin near the center of its range. In addition to the rarity of Torrey's bulrush in Wisconsin, it is also rare in Michigan, Indiana, Illinois, and Minnesota. Of the 24 Wisconsin occurrences, 6 have been confirmed in the last 20 years. Half of those are on Little Sand Lake in the Crandon Mine project area.

Conservation Concerns: Hydrologic changes; shoreline development.

Prairie Fame-flower (*Talinum rugospermum*) – Special Concern S3 G3G4

Prairie fame-flower is restricted to the central U.S., ranging from northwest Indiana, to Minnesota, Nebraska, and Kansas. In Wisconsin it is found scattered throughout the western and southern parts of the state in sand barrens, dry prairies, and dry oak woodlands. Wisconsin might have the largest number of populations in the world, with a total of 51 sites, all but 2 confirmed recently. There is one 2000 record from the Wolf River Basin.

Conservation concerns: May require periodic disturbance (it is often found in very old sandy road ruts), but cannot survive repeated, frequent trampling or vehicle traffic; vulnerable to fire suppression and succession due to high requirements for sun.

Waxleaf Meadowrue (*Thalictrum revolutum*) – Special Concern S2 G5

This odorous herb grows from Ontario to Wisconsin and south to Florida. Wisconsin botanists have found it in wet prairies and sedge meadows. Of the 26 Wisconsin occurrences, 8 have been confirmed in the last 20 years. There have been 4 collections, all from Winnebago County, from the Wolf River Basin.

Conservation Concerns: Wetland flooding or drainage.

Common Bog Arrow-grass (*Triglochin maritima*) – Special Concern S3 G5

This circumboreal species occurs south into the northeastern U.S. into our region where it is found in fens, marshes and bogs. Many of the sites occur in southeast Wisconsin and are protected on fens. However, roughly 50% of these occurrences are based on historical records. Farther north in the state, the species occurs along Lake Michigan and Lake Superior and inland in the northeast. There are 4 known occurrences in the Wolf River Basin, including the one occurrence within the planning area, found at Kohlhoff Lake in the Nicolet National Forest in 2000.

Conservation Concerns: Wetland flooding or drainage; altering groundwater hydrology

Snow Trillium (*Trillium nivale*) WI Threatened S3 G4

Snow trillium grows in rich moist forests from western Pennsylvania and West Virginia to Minnesota, southern South Dakota, western Nebraska, and Missouri. It is one of the earliest blooming plants, often flowering in early April. In Wisconsin, there have been 48 documented occurrences of which 34 have been verified in the past 20 years. Most of the populations are in the west-central and eastern 2 tiers of the state. There was one population documented in 2000 in the Wolf River Basin.

Conservation Concerns: Loss of habitat due to intensive forest management; herbivory from deer; poaching by spring wildflower fanciers.

Purple Bladderwort (*Utricularia purpurea*) – Special Concern S3 G5

This submerged aquatic plant occurs in southeast Canada and the eastern U.S. in soft water lakes and ponds. In Wisconsin, it has been collected about 25 times, mostly in the

northern part of the state with a concentration in the lake district around Northern Highland–American Legion State Forest. In the 1980s, botanists documented one population in Menominee County and another in Oconto County.

Conservation Concerns: Shoreline development and associated loss of habitat; disruption of hydrology; alteration of water quality.

Northeastern Bladderwort (*Utricularia resupinata*) – Special Concern S3 G4

Utricularia resupinata is found in southeastern Canada and the eastern U.S. It inhabits the edges of lakes and ponds where its stems grow just beneath the surface of the water in muddy, sandy substrate at or near the shoreline. Occurrences are scattered across Wisconsin's northern counties with a concentration in the lake district around Northern Highland–American Legion State Forest. Of the four occurrences in the Wolf River Basin, 2 are in the Crandon area, one site is in a vacation home area on the Menominee Reservation, and the last is in Oconto County.

Conservation Concerns: Shoreline development and associated loss of habitat; disruption of hydrology; alteration of water quality.

Dwarf Huckleberry (*Vaccinium cespitosum*) – WI Endangered S1 G5

This shrub grows across the boreal regions of North America, reaching as far south as the Colorado Rockies and, historically, Wisconsin Dells. Of the 11 known Wisconsin sites, 6 have been confirmed in the last 20 years. Botanists surveying the Crandon Mine project area found a population on private land in 1994.

Conservation Concerns: Loss of habitat due to succession in unmanaged barren habitats.

Mountain Cranberry (*Vaccinium vitis-idaea* ssp. *minus*) – WI Endangered S1 G5T5

Botanists have found this circumboreal shrub only a few times in Wisconsin. In the last 20 years, only 3 sites have been verified, one of them in the Wolf River Basin. In 1994, botanists surveying the Crandon Mine project area found a substantial population at a wetland along Swamp Creek.

Conservation Concerns: Wetland flooding or draining.

Marsh Valerian (*Valeriana sitchensis* ssp. *uliginosa*) – WI Threatened S1 4G5T4

This herb grows in calcareous wetlands, especially in fens and openings in cedar swamps. Ranging from northern New England and Ontario to the upper Midwest, Wisconsin marks its western extent. Of the 19 documented Wisconsin occurrences, 15 have been verified in the last 20 years. There are 5 records from the Wolf River Basin, including two recently recorded populations the Crandon Mine project area in addition to 2 older reports from Waupaca and Outagamie counties.

Conservation Concerns: Wetland flooding or draining.

Narrow-leaved Vervain (*Verbena simplex*) – Special Concern S1 G5

Narrow-leaved vervain is a species of dry soils of woods, fields, rocky places, and roadsides ranging from Ontario, Vermont, and Massachusetts to Minnesota and south to Florida and Texas. Of the 8 documented populations in Wisconsin, only 2 have been

verified in the past 20 years. Most of the occurrences have been in the southern half of the state. There is one 1979 record from Winnebago County in the Wolf River Basin.

Conservation concerns: Uncertain

Northern Wild-raisin (*Viburnum cassinoides*) – Special Concern S2 G5

Northern wild-raisin grows in swampy or sandy soil from Newfoundland to Manitoba and south along the Appalachian Mountains to Alabama. This shrub is at the western edge of its natural range in eastern Wisconsin. The state has only 5 locations, and none of them have been verified since 1976. In the Wolf River Basin an occurrence at Tranquil Wetland in Waupaca County was documented in 1973.

Conservation Concerns: Uncertain.

Long-spur Violet (*Viola rostrata*) - Special Concern S2 G5

This herb grows in rich, mesic woods from Quebec south to Georgia and west as far as central Wisconsin. Here, it seems closely allied with beech trees. A 1973 collection from a pasture near Kinney Lake in Waupaca County is the only current Wisconsin population off of the Door Peninsula. There are 26 other known occurrences in Wisconsin, 13 of them verified in the last 20 years.

Conservation Concerns: Logging might dry or reduce important humus layer.